CLAIMS

1. A gas backflow blocker for use in a process treating a particle mass passing in a substantially continuous flow from a first stage of the process to a downstream second stage, said first stage to be held at a lower pressure than that of the second stage, comprising:

a) an upright duct having an upper end and a lower end, for holding a column of the particle mass flowing therethrough;

b) first and second flow restrictors mounted at the upper and lower duct ends respectively, said first flow restrictor for receiving particles flowing from the first stage and limiting particle flow into the duct from the first stage and said second flow restrictor receiving flow from the duct and limiting particle flow from the duct into the second stage, at least one of said flow restrictors having a particle mass flow rate set by a flow rate signal;

c) a particle level sensor mounted on the duct adjacent the upper end and providing a level signal indicating the level of particles within the duct; and

d) a controller receiving the level signal and responsive thereto, providing a flow rate signal to the one of said flow restrictors to regulate particle flow through said flow restrictor to approximately maintain a predetermined particle mass level H within the duct at the level sensor.

2. The blocker of claim 1 adapted for use with a particle mass having a density D, a first stage pressure of P_h, and a second stage pressure of P_l, wherein the controller regulates H to approximately satisfy the equation $H \geq (P_h - P_l)/D$.

3. The blocker of claim 2, wherein the particle level sensor is mounted at an elevation of approximately $H = 1.3 \times (P_h - P_l)/D$ above the lower end of the duct.

4. The blocker of claim 1, wherein the first flow restrictor is of the type whose flow rate is set by the flow rate signal.

5. The blocker of claim 2 wherein the first flow restrictor comprises a rotary gate whose speed of rotation is controlled by the flow rate signal.

6. The blocker of claim 1, wherein the second flow restrictor flow rate is set by the flow rate signal.

7. The blocker of claim 6 wherein the first flow restrictor comprises a rotary gate whose speed of rotation is controlled by the flow rate signal.

8. The blocker of claim 1, wherein the pressure difference between the first and second stages creates a predetermined gas velocity V_g within and relative to the particle mass in the duct, and wherein at least one of the first and second flow restrictors is set to

provide a volume flow rate providing a downward velocity V_p of the particle mass in the duct, with $V_p > V_g$.

9. The blocker of claim 8, wherein at least one of the first and second flow restrictors is set to provide a volume flow rate providing a downward velocity V_p of the particle mass in the duct, with $V_p > .8\ V_{gf}$ where V_{gf} is a fluidization velocity causing the particle column to lose compactness.

10. The blocker of claim 1, wherein the distance between the lower end of the duct and the location of the particle sensor is greater than $(P_h - P_l)/D$, where P_h and P_l are the gas pressures at the first and second stages of the process respectively, and D is the effective mass density of the particles in the duct.

11. The blocker of claim 1, wherein the interior of the duct has an anti-stick surface.